Space Weather Forecast

Issued on Saturday, 30 December 2023 at 01:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of R1/Minor Radio Blackouts, mainly Days 1 (30 Dec) and 4 (02 Jan).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with occasional Common-class flares. The largest of which occurred at 29/0754 UTC and originated from a region in the northwest. There are six sunspot regions currently on the visible disc, most residing in the western hemisphere. The most complex region currently on the visible disc was responsible for the impulsive common-class flare previously mentioned. Another region, approaching the northwest limb, has been responsible for impulsive Common-class flares. One complex region in is in the process of rotating around the southwestern limb. Although it has history of producing flares, only the trailing portion remains visible and it is relatively small and simple. All the other regions appear simple and are either stable or in decline.

No Earth-directed coronal mass ejections (CMEs) have been observed in available coronagraph imagery.

Solar Wind / Geomagnetic Activity: Solar wind speeds as observed by DSCOVR at L1 were initially at slightly elevated levels, around 420 km/s. Winds gradually declined through the morning to 360 km/s. There was a brief discontinuity around 29/1200 UTC with solar wind parameters perhaps supporting the idea of a weak CME arrival. Total magnetic field strength, IMF, fluctuated between weak and moderate until 29/1130 UTC. Since then, it has been predominantly moderate. The important north-south component, Bz, has varied weakly throughout. Until 29/1130 UTC Bz was largely negative (southward oriented) but has since mainly been weakly positive (northward oriented). Geomagnetic activity was Quiet (Kp 0-2) through the period.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low activity is likely to continue, with a chance of Moderate activity. A couple of active regions are set to depart the disc during Days 1-2 (30-31 Dec) with new or returning regions due to rotate onto the disc by Day 4 (02 Jan).

Solar Wind / Geomagnetic Activity: No CMEs are expected to arrive at Earth during the forecast period. Connection to a stream of fast winds from a coronal hole, currently near centre disc, is anticipated either late on Day 2 (31 Dec) or early Day 3 (01 Jan), giving speeds of 450-550 km/s.

Geomagnetic activity is expected to be largely Quiet (Kp 0-2) through Days 1-2 (30-31 Dec). Activity is then expected to increase following connection to a stream of fast solar winds, with a risk of Active (Kp 4) intervals and a slight chance of reaching G1/Minor Geomagnetic Storm late Day 2 or early Day 3. Activity is then expected to decline to Quiet or Unsettled levels by Day 4 (Kp 0-3). Some enhancement to the auroral oval is possible late 31 Dec or early 01 Jan,

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although any sightings are likely to be limited to northern Scotland and similar latitudes.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

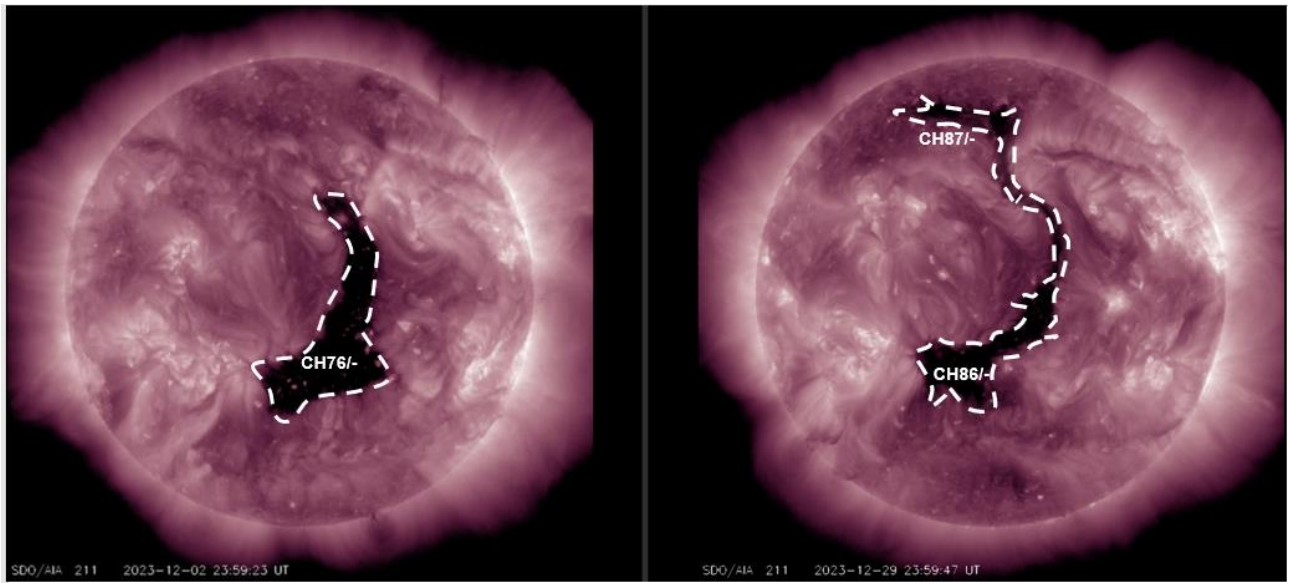

Figure 1: Coronal hole comparison between last rotation (02-03 Dec) and the current rotation (30-31 Dec) showing recurring feature and its changed size and shape.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	15	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	30	20	20	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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